HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

DRAFT

Hatchery Program	Skamania Summer Steelhead (Washougal River) Station Release and Outplants
Species or Hatchery Stock	Skamania Summer Steelhead *(Oncorhynchus mykiss)*
Agency/Operator	Washington Department of Fish and Wildlife
Watershed and Region	Washougal Subbasin/Lower Columbia Province
Date Submitted	nya
Date Last Updated	August 13, 2004

Section 1: General Program Description

1.1 Name of hatchery or program.

Skamania Summer Steelhead

1.2 Species and population (or stock) under propagation, and ESA status.

Summer Steelhead *(Oncorhynchus mykiss)*

ESA Status: Not listed and not a candidate for listing

1.3 Responsible organization and individuals.

Name (and title):	Richard Johnson
	Washougal-Skamania Hatcheries Complex Manager
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program.

Co-operators	Role
National Marine Fisheries Service	Manager of Mitchell Act Funds

1.4 Funding source, staffing level, and annual hatchery program operational costs.

Funding Sources
Mitchell Act

Funding for this program is provided through the Mitchell Act via National Marine Fisheries Service (NMFS) and through Clark Public Utility.

Operational Information	Number
Full time equivalent staff	4
Annual operating cost (dollars)	$463,581

The above information for full-time equivalent staff and annual operating cost applies cumulatively to Washougal/Skamania Hatchery Anadromous Fish Programs and cannot be broken out specifically by program.

1.5 Location(s) of hatchery and associated facilities.

Broodstock source	Skamania Hatchery- North Fork Washougal River
Broodstock collection location (stream, RKm, subbasin)	Skamania Hatchery/N.F. Washougal River/RKm 2.4/Washougal
Adult holding location (stream, RKm, subbasin)	Skamania Hatchery/N.F. Washougal River/RKm 2.4/Washougal
Spawning location (stream, RKm, subbasin)	Skamania Hatchery/N.F. Washougal River/RKm 2.4/Washougal
Incubation location (facility name, stream, RKm, subbasin)	Skamania Hatchery/N.F. Washougal River/RKm 2.4/Washougal; and Vancouver Hatchery/Off-Stream Near Vancouver, WA/Columbia Lower
Rearing location (facility name, stream, RKm, subbasin)	Skamania Hatchery/N.F. Washougal River/RKm 2.4/Washougal; and Vancouver Hatchery/Off-Stream Near Vancouver, WA/Columbia Lower

1.6 Type of program.

Isolated Harvest

1.7 Purpose (Goal) of program.

- Rear and release 60,000 smolts into the Washougal River system.
- The goal is to mitigate for activities within the Columbia River basin, which has reduced salmonid populations.
- The purpose is to provide maximum sport harvest under the selective fishery regulations (retention of adipose-clipped fish only).
- The on-station releases provide broodstock necessary for a 450,000 egg take goal for WDFW Region 5 steelhead transfers and out-plants.

For programs designed for steelhead harvest, WDFW tries to minimize natural escapement of hatchery fish to protect the genetic diversity of wild stocks. A commonly used approach for steelhead management is to maximize the difference between hatchery and wild stocks, so that if hatchery fish spawn, they are not likely to interbreed with wild spawners. Strategies used by WDFW to limit genetic and ecological risks include these actions: 1) limit the number of hatchery spawners by providing intense selective fisheries, and maintaining high trapping efficiency at the hatcheries or adult traps that remove hatchery fish prior to spawning; 2) advance the spawning timing of Chambers Creek and Skamania type steelhead stocks, so these fish spawn 3 months earlier than wild stocks, minimizing interbreeding between these two groups; 3) keep hatchery steelhead spawners in the lower river away from prime wild steelhead spawning areas through lower river releases and acclimation; 4) since the reproductive success of Chambers Creek stock is 11% of wild winter steelhead and Skamania Stock is 18% of wild summer steelhead, the few fish that do survive to spawn will produce few offspring; 5) use hatchery management practices, acclimation, timing, and lower river releases to limit steelhead residualism and the competition and predation that can occur when steelhead smolts residualize; and 6) Follow the Integrated Hatchery Operations Team (IHOT 1995) guidelines to limit disease risks from hatchery steelhead.

1.8 Justification for the program.

- The program is authorized under the Columbia River Fisheries Development Program, Columbia River Fish Management Plan and U.S. vs. Oregon.
- To provide selective fisheries WDFW protects listed fish and provides harvest opportunity through the Fish Management and Evaluation Plan (FMEP 2002). The objectives of the WDFW's FMEP are based on the WDFW Wild Salmonid Policy. In that policy, it states that harvest rates will be managed so that 1) spawner abundance levels abundantly utilize available habitat, 2) ensure that the number and distribution of locally adapted spawning populations will not decrease, 3) genetic diversity within populations is maintained or increased, 4) natural ecosystem processes are maintained or restored, and 5) sustainable surplus production above levels needed for abundant utilization of habitat, local adaptation, genetic diversity, and ecosystem processes will be managed to support fishing opportunities (WDFW 1997). In addition, fisheries will be managed to ensure adult size, timing, distribution of the migration and spawning populations, and age-at-maturity are the same between fished and unfished populations. By following this policy, fisheries' impacts to listed steelhead, chinook salmon, and chum salmon in the Lower Columbia River (LCR) Evolutionary Significant Unit (ESU) will be managed to promote the recovery of these species and not at rates that jeopardize their survival or recovery.

In order to minimize impact on listed fish by WDFW facilities operation and the Washougal summer steelhead program, the following Risk Aversion are included in this HGMP:

Table 1. Summary of risk aversion measures for the Washougal summer steelhead program.

Potential Hazard	**HGMP Reference**	**Risk Aversion Measures**
Water Withdrawal	4.2	Water rights are formalized through trust water right #S2-23896 from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports.
Intake Screening	4.2	WDFW has requested funding for future scoping, design, and construction work of a new river intake system to meet NOAA compliance (Mitchell Act Intake and Screening Assessment 2002).
Effluent Discharge	4.2	This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) administered by the Washington Department of Ecology (DOE) - WAG 13-1008.
Broodstock Collection & Adult Passage	7.9	Listed fish are not collected. The hatchery weir and associated intake facilities need repairs to provide compliant passage.
Disease Transmission	7.9, 10.11	*Fish Health Policy in the Columbia Basin*. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).
Competition & Predation	See also 2.2.3, 10.11	Current risk aversions and future considerations are being reviewed and evaluated for further minimizing impacts to listed fish.

1.9 List of program "Performance Standards".

See HGMP section 1.10

1.10 List of program "Performance Indicators", designated by "benefits" and "risks".

1.10.1 Benefits:

Benefits		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
Assure that hatchery operations support Columbia River fish Mgt. Plan *(US v Oregon)*, production and harvest objectives	Contribute to a meaningful harvest for sport, tribal and commercial fisheries. Achieve a 10-year average catch of 827 adults at current production levels.	Survival and contribution to fisheries will be estimated for each brood year released. Work with co-managers to manage adult fish returning in excess of broodstock need.
Maintain outreach to enhance public understanding, participation and support of Washington Department of Fish & Wildlife (WDFW) hatchery programs	Provide information about agency programs to internal and external audiences. For example, local schools and special interest groups tour the facility to better understand hatchery operations. Off station efforts may include festivals, classroom participation, stream adoptions and fairs.	Evaluate use and/or exposure of program materials and exhibits as they help support goals of the information and education program. Record on-station organized education and outreach events.
Program contributes to fulfilling tribal trust responsibility mandates and treaty rights	Follow pertinent laws, agreements, policies and executive and judicial orders on consultation and coordination with Native American tribal governments	Participate in annual coordination meetings between the co-managers to identify and report on issues of interest, coordinate management, and review programs (FBD process).
Implement measures for broodstock management to maintain integrity and genetic diversity Maintain effective population size.	A minimum of 400 adults are collected throughout the spawning run in proportion to timing, age and sex composition of return	Annual run timing, age and sex composition and return timing data are collected. Adhere to WDFW spawning guidelines. (Seidel 1983)
Region-wide, groups are marked in a manner consistent with information needs and protocols to estimate impacts to natural and hatchery origin fish	Use mass-mark (adipose-fin clip) for selective fisheries.	Returning fish are sampled throughout their return for length, sex and marks.
Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens. Follow Co-managers Fish Health Disease Policy (1998).	Necropsies of fish to assess health, nutritional status, and culture conditions	WDFW Fish Health Section inspect adult broodstock for pathogens yearly and monitor juvenile fish on a monthly basis to assess health and detect potential disease problems. As necessary, WDFW's Fish Health Section recommends remedial or preventative measures to prevent or treat disease, with administration of therapeutic and prophylactic treatments as deemed necessary A fish health database will be maintained to identify trends in fish health and disease and implement fish health management plans based on findings.
	Release and/or transfer exams for pathogens and parasites	1 to 6 weeks prior to transfer or release, fish are examined in accordance with the Co-managers Fish Health Policy
	Inspection of adult broodstock for pathogens and parasites	At spawning, lots of 60 adult broodstock are examined for pathogens
	Inspection of off-station fish/eggs prior to transfer to hatchery for pathogens and parasites	Controls of specific fish pathogens through eggs/fish movements are conducted in accordance to Co-managers Fish Health Disease Policy.

1.10.1 Risks:

Risks		
Performance Standard	**Performance Indicator**	**Monitoring & Evaluation**
Minimize impacts and/or interactions to ESA listed fish	Hatchery operations comply with all state and federal regulations. Hatchery juveniles are raised to smolt-size (5.0–5.5 fish/lb) and released from the hatchery at a time that fosters rapid migration downstream. Mass mark production fish to identify them from naturally produced fish (except CWT only groups)	As identified in the HGMP: Monitor size, number, date of release and mass mark quality. Additional WDFW projects: straying, instream evaluations of juvenile and adult behaviors, NOR/HOR ratio on the spawning grounds, fish health documented.
Artificial production facilities are operated in compliance with all applicable fish health guidelines, facility operation standards and protocols including IHOT, Co-managers Fish Health Policy and drug usage mandates from the Federal Food and Drug Administration	Hatchery goal is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stocks and to produce healthy smolts that will contribute to the goals of this facility.	Pathologists from WDFW's Fish Health Section monitor program monthly. Exams performed at each life stage may include tests for virus, bacteria, parasites and/or pathological changes, as needed
Ensure hatchery operations comply with state and federal water quality and quantity standards through proper environmental monitoring	NPDES permit compliance WDFW water right permit compliance	Flow and discharge reported in monthly NPDES reports.
Water withdrawals and instream water diversion structures for hatchery facility will not affect spawning behavior of natural populations or impact juveniles.	Hatchery intake structures meet state and federal guidelines where located in fish bearing streams.	Barrier and intake structure compliance assessed and needed fixes are prioritized.
Hatchery operations comply with ESA responsibilities	WDFW completes an HGMP and is issued a federal and state permit when applicable.	Identified in HGMP and Biological Opinion for hatchery operations.
Harvest of hatchery-produced fish minimizes impact to wild populations	Harvest is regulated to meet appropriate biological assessment criteria. Mass mark juvenile hatchery fish prior to release to enable state agencies to implement selective fisheries.	Harvests are monitored by agencies and tribes to provide up to date information.

1.11.1 Proposed annual broodstock collection level (maximum number of adult fish).

200 males and 200 females are needed to reach production goals and on-station broodstock needs. Egg take goal is 450,000 (FBD 2004). Production goals supports transfers and outplants to acclimation facilities and direct plants to Region 5 streams totaling up to 204,000 fish. Additional eggs are taken to cover potential loss.

1.11.2 Proposed annual fish release levels (maximum number) by life stage and location.

Age Class	Annual Release Level	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Yrlg	60,000	5.0/ 5.5	April 15- May	N.F. Washougal & Main Washougal	2.4 & 3.2	Washougal	Lower Columbia

Age Class	Annual Release Level	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province

The following programs originate from this HGMP:

Transfers to Acclimation Facilities* and /or direct release to stream from this HGMP:							
Yrlg	20,000	6.0-10.0	April 15-May 15	White Salmon River	1.5	Big White Salmon	Lower Columbia
Yrlg*	30,000	6.0-10.0	April 15-May 15	Kalama River	8.0	Kalama	Lower Columbia
Yrlg*	25,000	6.0-10.0	April 15-May 15	N.F. Toutle River	.8	Toutle - Cowlitz	Lower Columbia
Yrlg*	25,000	6.0-10.0	April 15-May 15	S.F. Toutle River	6	Toutle - Cowlitz	Lower Columbia
Yrlg*	50,000	6.0-10.0	April 15-May 15	N.F. Lewis River	1.5	Lewis	Lower Columbia
Yrlg	25,000	5.0–5.5	April 15-May 15	E.F. Lewis	14	Lewis	Lower Columbia
Yrlg	100,000	5.0-5.5	April 15-May 15	Klickitat	27, 22, 20, 18, & 10	Klickitat	Upper/Lower Columbia

1.12 Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

Fish are released for harvest and escapement. Smolt-to-adult survival rates are not available. Average annual catch since 1990/91 was 827 steelhead (WDFW Historical database).

Table 2. Sport Harvest on the Washougal River.

Return Year	Sport Harvest Hatchery
1990/91	2,023
1991/92	1,522
1992/93	1,593
1993/94	667
1994/95	250
1995/96	561
1996/97	172
1997/98	66
1998/99	166
1999/00	876
2000/01	1,002
2001/02	1,023
2002/03	Na
Average	827

1.13 Date program started (years in operation), or is expected to start.

The first year of operation for this hatchery was 1957.

1.14 Expected duration of program.

This program will be on-going to continue selective fisheries.

1.15 Watersheds targeted by program.

WRIA 28 - Washougal River North Fork & Washougal River in the Lower Columbia Province

1.16 Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

1.16.1 Brief Overview of Key Issues

Efforts to propagate summer returning steelhead date back to 1915. Early efforts hatched eggs and released fry or fingerlings with little or no measurable returns. In 1956, with money from Columbia River Basin fishery enhancement funds administered by the National Marine Fisheries Service, the Skamania Hatchery was built on the North Fork Washougal River for the culture of summer steelhead. Adults were collected both at the hatchery site and at the barrier dam at the Washougal salmon hatchery after it's construction. Due to low numbers of returning adults in the late 1950s, additional summer steelhead were trapped in the Klickitat River and transferred to the Skamania Hatchery for spawning. Initially, Klickitat stock progeny were fin clipped for identification and segregation, however, by 1963, Washougal native steelhead and Klickitat native steelhead were mixed and spawned together to produce the present Skamania summer steelhead. As was the case with winter steelhead, the earliest maturing adults have been selected in order to produce one-year smolts. Skamania summer steelhead have been used as the parent stock for runs created at various rearing ponds and hatcheries throughout the state (Crawford, 1979). Currently, all harvest augmentation hatchery production of summer steelhead in Puget

Sound use local returns of Skamania origin fish.

The Skamania Hatchery summer steelhead program produces smolts for planting in many regional streams. Skamania summer steelhead stock are released into the Washougal River to continue a summer steelhead sport fishery while eliminating a directed harvest on wild summer steelhead and to maintain a broodstock for this program. Smolts are released from the hatchery into the North Fork Washougal River to encourage migration back to the facility, which is at the upper end of the sport fishery so that they are highly susceptible to harvest. Any adults that escape the fishery may spawn in the system, but a series of falls on the upper mainstem provides a measure of separation between hatchery steelhead and the main spawning area of the wild summer steelhead. For future out-plants to the Klickitat River, the Yakima/Klickitat Fisheries Project (YKFP) Transition Plan calls for phasing out Skamania Hatchery stock and shifting to supplementation of naturally spawning Klickitat stock. Implementation of this new effort would be conducted at the Klickitat Hatchery.

1.16.2 Potential Alternatives to the Current Program

Alternative 1: Eliminate the non-local program and use the native stock for this program. WDFW is currently involved in a research project on the Kalama River that will provide information on the feasibility of using the native population. This alternative would require utilizing the local stock, which could not occur without better knowledge of the condition of the wild stock.

Alternative 2: Eliminate the program. This action would significantly reduce potential interaction with the natural population and eliminate impacts on other ESA listed species. This alternative is not considered acceptable. Currently this program supports a very popular sport fishery in the Washougal River and elsewhere.

Alternative 3: Develop a trap at Salmon Falls to facilitate broodstock selection and segregation from native stocks. A trap at Salmon Falls Fishway would limit the majority of the hatchery production to the river downstream of the barrier. A trap at Salmon Falls would facilitate the change to an integrated program for all hatchery steelhead and salmon populations in the watershed. This would allow WDFW to switch to native steelhead broodstocks and allow for the broodstock collection needs in chinook and coho programs. This would increase natural spawning by chinook in areas where they historically existed. A trap would create a wild steelhead sanctuary where no hatchery-origin fish would be allowed to enter, thereby preserving their genetic integrity. Inter- and intra- species competition, disease transfer, residualism, and crossbreeding, would be reduced or eliminated.

1.16.3 Potential Reforms and Investments

Reform/Investment 1: When conditions dictated, the Washougal/Skamania Hatchery was unable to capture all of the returning adult steelhead. At this time, with funds from NOAA Fisheries, a consultant is studying the ability to control upstream passage of hatchery fish with a barrier of some type. Additive to this is the WDFW Mitchell Act Intake and Fish Passage Study Report (2002), which will try to fold in the need for passage and compliance at the same time. As the investigation and comprehensive review unfolds it is clear that most of these items will require major capitol investments to solve. Current screening and passage is non compliant with current NOAA Fisheries standards for ESA fish.

Reform/Investment 2: This trap and handle facility has several issues related to unsafe handling of adult listed fish. A complete investigation and comprehensive re-design is needed to accommodate a facility that can be installed and removed without putting machinery in the stream, as well as a trap facility that will sort, return to the stream, and/or load fish with a water to water transfer method to cause no harm to hatchery or wild stocks. Adult sorting and

handling, in general, is very hard on adult fish and routinely causes mortality. This can be prevented with a modern semi-automated sorting and handling system. This sorting system would be comprised of an initial holding pond that would collect and hold the fish until sorting is initiated by opening a gate, which allows adults to be attracted through a false weir and onto a fabricated, sloped, sorting chute. The chute contains paddles and side chutes. The side chutes lead to different adult ponds, and also provide returns to the river above and below the in-stream barrier. An observer that is located in a control tower above the main chute identifies the fish as it enters the chute and then activates the paddles to direct the fish to the desired location. Staff does not physically handle the fish during this sorting process.

Reform/Investment 3: Mitchell Act funding has not kept up with fish production programs, or monitoring and evaluation needs for many years. As a result, two of the eight WDFW Mitchell Act hatcheries are closed, overall fish production is 14% lower than the average for the past 24 year period, and the needs for adequate monitoring and evaluation continues to escalate with ESA requirements. Additive to this growing problem is the facilities aging infrastructure. In the area of compliance, we find it very difficult to continue programs with a high level of confidence and still sustain ESA compliance in screening, adult handling, and passage areas. The solution to many of the existing problems is Capitol and Operations budgets that will meet the deficiency's we describe in this process.

Reform/Investment 4: If the local stock were to be used for this program, monitoring and evaluation will be needed to insure that the survival of the native population is not impacted and to decrease the risk of impacting other ESA listed species.

Reform/Investment 5: To use Salmon Falls Fishway as a trap, extensive modifications will need to be made and funds will be needed to operate the trap. Two designs have been suggested: 1) A wire strung above the 500 year flood elevation, bolted into the bedrock on either side. A curtain of weighted stringers would lie over the upstream side of the falls to block jumping fish. 2) A wood or steel lip or platform extending out over the face of the falls would look more natural from a distance, reducing potential complaints.

Reform/Investment 6: If the local stock were to be used for this program, investments into the rearing and holding systems will need to happen. The rearing system would require smaller rearing vessels as well as some heated water to accelerate growth to make one year smolts from stock across the entire run time.

Section 2: Program Effects on ESA-Listed Salmonid Populations

2.1 List all ESA permits or authorizations in hand for the hatchery program.

Program is described in the "Biological Assessment for the Operation of Hatcheries Funded by the National Marine Fisheries Service" (March 99). Also, statewide Section 6 consultation with USFWS for interactions with Bull Trout, and concurrent with this HGMP to satisfy Section 7 consultations: During 2004, WDFW is writing HGMP's to cover all stock/programs produced at Washougal Complex including; Columbia River chum, fall chinook, coho, summer and winter run steelhead

2.2 Descriptions, status and projected take actions and levels for ESA-listed natural populations in the target area.

The following ESA listed natural salmonid populations occur in the sub-basin where the program fish are released:

ESA listed stock	Viability	Habitat
Fall Chinook	H	H
Chum- Natural	M	L
Summer Steelhead	H	H
Late Winter Steelhead-Natural	H	H
Coho- Natural and Hatchery (Proposed)	Na	Na
H, M and L refer to high, medium and low ratings, low implying critical and high healthy.		

2.2.1 Description of ESA-listed salmonid population(s) affected by the program.

Identify the ESA-listed population(s) that will be directly affected by the program.
None.

Identify the ESA-listed population(s) that may be incidentally affected by the program.

Lower Columbia River fall chinook salmon *(Oncorhynchus tshawytsch*a) are federally listed as "threatened" under the ESA on March 24, 1999.
Columbia River chum salmon *(Oncorhynchus keta*) - Mainstem chum were listed as "threatened" under the ESA on March 25, 1999.
Lower Columbia River steelhead *(Oncorhynchus mykiss*), were listed as "threatened" under the ESA on March 19, 1998. In Washington, the LCR steelhead ESU includes winter and summer steelhead in tributaries to the Columbia River between the Cowlitz River and Wind River.
Lower Columbia River coho (*Oncorhynchus kisutch*) has been proposed for listing as "threatened" on June 14, 2004.

2.2.2 Status of ESA-listed salmonid population(s) affected by the program.

Describe the status of the listed natural population (s) relative to "critical" and "viable" population thresholds.

Critical and viable population thresholds have not been established for these ESUs and the populations within them. NMFS has formed a Lower Columbia River/Willamette River Technical Review Team to review population status within these ESUs and develop critical and viable population thresholds.

Lower Columbia River fall chinook salmon *(Oncorhynchus tshawytsch*a) within the Evolutionary Significant Unit (ESU) are federally listed as "threatened" under the Endangered Species Act effective May 24, 1999.

Status: In Washington, the LCR chinook ESU includes all naturally spawned chinook populations from the mouth of the Columbia River to the Cascade Crest. Native fall chinook have been reported in the Washougal, but a distinct stock no longer exists. The Washougal River fall chinook natural spawners are a mixed stock of composite production. Natural spawning does occur, but these fish are identified as hatchery strays and there are no natural spawning escapement goals. Washougal River fall chinook spawn in the area from Salmon Falls (RM 14.5) downstream approximately 4.0 miles. Natural spawning occurs in the Washougal River slightly later (October to November) than other lower Columbia River tule fall chinook stocks. Natural escapement is estimated using spawning ground counts within selected index areas. Natural spawner escapements from 1967-1991 averaged 1,832 with a low return of 70 in 1969 and a peak return of 4,578 in 1989. Since 1971, the annual natural escapement has averaged 2,157 fish. SASSI (1993) listed the Washougal River fall chinook natural spawner stock status as healthy based on escapement trends.

Table 3. Fall chinook salmon abundance estimates in the LCMA (FMEP 2003)

Year	Cowee-man River	Cowlitz River	Green River	Toutle River	Kalama River	EF Lewis River	NF Lewis River	Washougal River	Wind River Bright	Wind River Tule
1990	241	2,698	123		20,54	342	17,506	2,062	177	11
1991	174	2,567	123	33	5,085	230	9,066	3,494	269	52
1992	424	2,489	150		3,593	202	6,307	2,164	51	54
1993	327	2,218	281	3	1,941	156	7,025	3,836	686	0
1994	525	2,512	516	0	2,020	395	9,939	3,625	1,101	11
1995	774	2,231	375	30	3,044	200	9,718	2,969	278	4
1996	2,148	1,602	667	351	10,630	167	14,166	2,821	58	166
1997	1,328	2,710	560		3,539	307	8,670	4,529	220	148
1998	144	2,108	1,287	66	4,318	104	5,929	2,971	953	202
1999	93	997	678	42	2,617	217	3,184	3,105	46	126
2000	126	2,700	852	27	1,420	323	9,820	2,088	25	14
2001	646	5,013	4,951	132	3,714	530	15,000	3,901	217	444
2002	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na
2003	Na	Na	Na	Na	Na	Na	Na	Na	Na	Na

Columbia River chum salmon *(Oncorhynchus ket*a); Mainstem chum within the lower Columbia River Evolutionary Significant Unit (ESU) are federally listed as threatened effective May 24, 1999).

Status: Historically, chum salmon were abundant in lower portions of the Columbia River and supported annual harvests of hundreds of thousands of fish. Currently, relative abundance of chum salmon is likely less than one percent of historical levels and spawning is known to occur in only three streams (Hardy Creek, Hamilton Creek, and Grays River). Spawner surveys of

chum salmon in three streams indicated that a few hundred to 10,000 chum salmon spawn each year in the Columbia River Basin. Presently, there are no recreational or commercial fisheries for chum salmon in the Columbia River although some fish are incidentally taken in the gill-net fisheries for coho and chinook salmon. As chum emerge in mid-March and spend minimal time in freshwater, the window for chum migration is believed to be complete by early spring prior to the Washougal program summer steelhead releases in late April-May. There have been a few historical records of chum salmon in the mainstem Washougal River. However, previous surveys were conducted primarily for fall chinook coded wire tag recoveries and upstream of typical chum spawning areas. They were not conducted during chum spawning times or at downriver spawning locations. In 1998, WDFW performed limited non-index spawning ground surveys and found one chum in the Washougal. In 2000, BPA funded PSMFC to conduct more intensive non-index surveys. One chum was found in Lacamas Creek, a downstream tributary (RM 0.8) of the Washougal in 2000. Summer steelhead releases into the mainstem Washougal enters the Columbia system approximately 20 miles downstream of Hardy and Hamilton creeks and approximately 100 miles upstream of the Grays River which are the last known chum spawning areas in the Columbia.

Table 4. Peak counts of adult chum salmon spawning Between Bonneville Dam and the I-205 Bridge.

Year	Hamilton Creek (Including Spring Channel)	Hardy Creek	Duncan Creek	Mainstem Columbia Ives Island Area	Mainstem Columbia Ives Island to I-205
2002	1,387	291	5 [1/]	1,471	732
2001	691	498	13 [1/]	256	546
2000	199	20	0	249	82
1999	182	157	1	41	12
1998	280	443	1	117	No Count
1997	145	105	1	15	No Count
1996	86	140	1	0	No Count
1995	20	130	0	7	No Count
1994	69	264	No Count	22	No Count
1993	20	324	No Count	39	No Count
1992	149	635	No Count	No Count	No Count
1991	19	125	0	No Count	No Count
1990	51	116	No Count	No Count	No Count
1989	25	9	No Count	No Count	No Count
1988	132	436	No Count	No Count	No Count

[1/] *Voluntary fish only. Does not include fish collected during re-introduction efforts and placed into the channels above the weirs.*

Lower Columbia River steelhead *(Oncorhynchus mykiss*), were listed as threatened under the ESA on March 19, 1998. In Washington, the LCR steelhead ESU includes winter and summer steelhead in tributaries to the Columbia River between the Cowlitz River and Wind River.

Status of summer and winter runs: Steelhead located in tributaries from the Cowlitz River to the Wind River, inclusive, are considered part of the Lower Columbia ESU and these fish are listed as threatened under the Endangered Species Act (ESA). WDFW also considers most of these populations as depressed. However, Kalama winter steelhead are considered healthy. WDFW is currently monitoring wild steelhead populations and if the need arises WDFW, with concurrence from NMFS, will move forward with hatchery recovery actions including supplementation to recover listed fish. WDFW is evaluating the use of locally adapted stocks in the Kalama and other basins. If this program is successful at minimizing ecological and genetic

risks and providing an enhanced sport fishery, WDFW will consider expanding this program to others rivers in the ESU including the Lewis, Washougal, Wind, and White Salmon.

Winter steelhead are distributed in the mainstem Washougal, the Little Washougal and various tributaries within the Washougal sub-basin. Generally, Dougan Falls (RM 21.6) is considered the upstream extent of winter steelhead distribution in the mainstem Washougal. Winter steelhead also move well into the headwaters of the Little Washougal watershed. Winter steelhead are known to spawn and rear in most of the major streams within WRIA 28. According to SASSI (WDF et al. 1993), winter steelhead are native to and classified as a distinct stock based on the geographical isolation of the spawning population in Salmon Creek, the mainstem Washougal River, the North (West) Fork Washougal River, and in Hamilton Creek. All lower Columbia River steelhead stocks are characterized as native in origin and wild production type. According to the LCSCI (1998), WDFW feels that these designations are accurate even in streams where there is significant spawning by hatchery steelhead, since the peak egg-take occurs in January in lower Columbia River steelhead hatcheries and peak spawning for wild fish is in April. Similar to other wild winter steelhead stocks in the lower Columbia River area, run timing for the WRIA 28 stocks is generally from December through April and spawn-timing is generally from early March to late May or early June (WDF et al. 1993). Wild winter steelhead abundance estimates from the Lower Columbia River FMEP (WDFW 2001 (updated 2003)) indicates a range of wild fish of 114 fish to 294 fish from 1991 thru 1999. The SASSI stock status of winter steelhead in the Washougal River was "unknown" in 1992. The LCSCI stock status update in 1998 listed the stock as "depressed" based on a short-term severe decline. The SaSI (WDFW web site, 2002) spawner escapement goal was 841 wild winter steelhead for the Washougal mainstem. This escapement goal for wild winter steelhead was lowered to 541 fish with the LCSCI update. From 1991-1999 returns of winter steelhead have been only 28% of the escapement goals for the Washougal.

Table 5. Wild summer steelhead abundance estimates in the LCMA (FMEP 2003).

Brood Year	Pop Est. Trap	Snorkel Surveys			Index/Redds
	Kalama	EF Lewis	Washougal	Wind	Wind
1990	745		156	116	228
1991	704		31	123	294
1992	1,075		77	129	287
1993	2,283		71	101	
1994	1,041		49	104	
1995	1,302		70	136	84
1996	614	85	44	96	
1997	598	93	57	106	106
1998	205	61	112	44	
1999	220	60	115	43	96
2000	140	99	118	26	
2001	329	117	145		
2002	Na	Na	Na	Na	Na
2003	Na	Na	Na	Na	Na

Table 6. Wild winter steelhead abundance estimates in the LCMA (FMEP 2003).

Brood Year	Index Redd Surveys					Pop. Est. Trap Counts		Index Trap/redd
	Coweeman	SF Toutle	Green	EF Lewis	Washougal	NF Toutle	Kalama	Cedar Creek
1990	522	752	86	102		36	419	
1991		904	108	72	114	108	1,128	
1992		1,290	44	88	142	322	2,322	
1993	438	1,242	84	90	118	165	992	
1994	362	632	128	78	158	90	853	
1995	252	396	174	53	206	175	1,212	
1996	44	150				251	853	70
1997	108	388		192	92	183	537	78
1998	314	374	118	250	195	149	438	38
1999	126	562	72	276	294	129	562	52
2000	290	490	124	207	939	238	941	
2001	284	334	192	79	216	185	1085	
2002	Na	Na	Na	Na	Na	Na	Na	Na
2003	Na	Na	Na	Na	Na	Na	Na	Na

Lower Columbia River coho (*Oncorhynchus kisutch*) has been proposed for listing as "threatened" on June 14, 2004.

Status: NMFS concludes that the LCR coho ESU includes all naturally spawned populations of coho salmon in the Columbia River and its tributaries from the mouth of the Columbia up to and including the Big White Salmon and Hood Rivers. Twenty-one artificial propagation programs are considered to be part of the ESU as NMFS has determined that these artificially propagated stocks are genetically no more than moderately divergent from the natural populations. Washougal River wild coho run is a fraction of its historical size. In 1949, it was estimated that the Washougal had spawning area for 6,000 pair of salmon; 5,000 below Salmon Falls and 1,000 between Salmon and Dougan Falls. In 1951, WDF estimated coho escapement to the basin to be 3,000 fish. Hatchery production accounts for most coho returning to the Washougal River while natural coho production is presumed to be very low. Natural coho production is limited to lower river tributaries downstream of Dougan Falls and has persisted at low levels in the Little Washougal River. Coho have been planted in the Washougal basin since 1958 with extensive hatchery coho releases having occurred since 1967.

2.2.3 Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take.

Describe hatchery activities: The following activities listed below are identified as general hatchery actions that are identified in the ESA Section 7 Consultation "Biological Opinion on Artificial Propagation in the Columbia River Basin" (March 29, 1999).

Broodstock Program:

Broodstock Collection: Summer steelhead begin entering the Washougal system from June and continue through October with hatchery broodstock entering the Skamania holding ponds in October and November and spawned close to that time frame. Spawning time differences are significant between adult hatchery steelhead and wild steelhead. At Skamania Hatchery approximately 5 non-clipped steelhead volitionally swim into the trap yearly (Richard Johnson, pers. comm. 2004). Crew can quickly distinguish wild steelhead (with adipose fin) and transport fish back to an approved upstream site as indicated by Region 5 staff. Fish are placed in a tube, taken to a tanker truck and then transported to the river.

Genetic introgression: To reduce the number of hatchery fish that could interbreed with listed steelhead, WDFW uses a wild steelhead management strategy removing hatchery marked steelhead through selective harvest and aggressive trapping programs. In areas where there is little overlap of timing with potential later spawning wild steelhead, hatchery fish can be recycled through heavy sport harvest areas. After recycling and additional harvest, hatchery fish can be used for landlocked lake opportunities or for nutrient enhancement needs. Acclimation and releases of smolts from the Washougal /Skamania facilities are in the lowest reaches below known wild stock spawning areas. Indirect take from genetic introgression is unknown.

Rearing Program:

Operation of Hatchery Facilities: Facility operation impacts include water withdrawal, hatchery effluent, and intake compliance. Impact on listed fish is unknown but monitoring and maintenance are conducted along with staff observations. Washougal/Skamania hatcheries withdraw water from the watershed. This can further reduce low flows in late summer and early fall from the sections between the intake location and where the non-consumptive water rejoins the river. On the Skamania, this is approximately a distance of 1600 feet and on the Washougal River this is a distance of approximately 2000 ft. (Mitchell Act Hatcheries Intake and Fish Passage Study report April (2002). Water intakes have engineered design criteria to minimize impingement of naturally produced fish on intake screens and the Mitchell Act Hatcheries Intake and Passage Study (April 2002) has assessed which structures are ESA compliant and forwarded needed improvements for funding. Effluent at outfall areas is rapidly diluted with main stem flows and operation is within permitted guidelines. (See HGMP Sections 4.1 and 4.2). Indirect take from this operation is unknown.

Disease: Outbreaks in the hatchery may cause significant adult, egg, or juvenile mortality. Over the years, rearing densities, disease prevention and fish health monitoring have greatly improved the health of the programs at Washougal/Skamania hatcheries. Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries (IHOT 1994) chapter 5 have been instrumental in reducing disease outbreaks.

Release:

Hatchery Production/Density-Dependent Effects: Hatcheries can release numbers of fish that can exceed the density of the natural productivity in a limited area for a short period of time and can compete with listed fish. WDFW proposes to continue monitoring, research and reporting of hatchery smolt migratory performance behaviors (Kalama River research efforts) that will be used to assess and adjust, if necessary, hatchery production and release strategies. Any additional smolts or sub-smolts above program goals could be lake planted for resident fish harvest rather than be released. The Skamania steelhead hatchery program maximizes smolting condition through behavior, acclimation and releases at lower sites, timing, feed management and condition factor so releases will migrate quickly, thus reducing affects of density limiting factors such as residualism, competition and predation. Summer steelhead average releases for the last four years (avg. 59,614 from 2000-2003) have been reduced approximately 50% (avg. 120,975) from 1996 -1999. Indirect take from genetic introgression is unknown.

Competition: Salmon and steelhead feed actively during their downstream migration (Becker 1973; Muir and Emmelt 1988; Sager and Glova 1988) and if they do not migrate they can compete with wild fish. WDFW is unaware of any studies that have empirically estimated the competition risks to listed species posed by the program described in this HGMP. Studies conducted in other areas indicate that this program is likely to pose a minimal risk of competition:

1) As discussed above, coho salmon and steelhead released from hatchery programs as smolts typically migrate rapidly downstream. The SIWG (1984) concluded that “migrant fish will

likely be present for too short a period to compete with resident salmonids." On station release in large systems may travel even more rapidly – migration rates of approximately 20 river miles per day were observed by steelhead smolts in the Cowlitz River (Harza 1998).

2) NMFS (2002) noted that "where interspecific populations have evolved sympatrically, chinook salmon and steelhead have evolved slight differences in habitat use patterns that minimize their interactions with coho salmon (Nilsson 1967; Lister and Genoe 1970; Taylor 1991). Along with the habitat differences exhibited by coho and steelhead, they also show differences in foraging behavior. Peterson (1966) and Johnston (1967) reported that juvenile coho are surface oriented and feed primarily on drifting and flying insects, while steelhead are bottom oriented and feed largely on benthic invertebrates."
3) Flagg et al. (2000) concluded, "By definition, hatchery and wild salmonids will not compete unless they require the same limiting resource. Thus, the modern enhancement strategy of releasing salmon and steelhead trout as smolts markedly reduces the potential for hatchery and wild fish to compete for resources in the freshwater rearing environment. Miller (1953), Hochachka (1961), and Reimers (1963), among others, have noted that this potential for competition is further reduced by the fact that many hatchery salmonids have developed different habitat and dietary behavior than wild salmonids." Flagg et al (2000) also stated "It is unclear whether or not hatchery and wild chinook salmon utilize similar or different resources in the estuarine environment."
4) Fresh (1997) noted that "Few studies have clearly established the role of competition and predation in anadromous population declines, especially in marine habitats. A major reason for the uncertainty in the available data is the complexity and dynamic nature of competition and predation; a small change in one variable (e.g., prey size) significantly changes outcomes of competition and predation. In addition, large data gaps exist in our understanding of these interactions. For instance, evaluating the impact of introduced fishes is impossible because we do not know which nonnative fishes occur in many salmon-producing watersheds. Most available information is circumstantial. While such information can identify where inter- or intra-specific relationships may occur, it does not test mechanisms explaining why observed relations exist. Thus, competition and predation are usually one of several plausible hypotheses explaining observed results."

Predation: Steelhead released from this program may prey upon listed species of salmonids, but the magnitude of predation will depend upon the characteristic of the listed population, the habitat in which the population occurs and the characteristics of the hatchery program (e.g.. release time, location, number released and size upon release). The site-specific nature of predation and the limited number of empirical studies that have been conducted, make it difficult to predict the predation effects of this specific hatchery release. WDFW is unaware of any studies that have empirically estimated the predation risks to listed fish by this program. In the absence of site-specific empirical information, the identification of risk factors can be a helpful tool for reviewing hatchery programs while monitoring and research programs such as those on the Kalama River are developed and implemented.

Predation Risk Factors:

Environmental Characteristics: These characteristics can influence the level of predation (see SIWG (1984) for a review) with risk greatest in small systems during periods of low flow and high clarity. The Washougal watershed is a large river with historical flows ranging from a high of 40,000 cfs to a low of 70 cfs. From mid-March until late April, flows averaging approximately 1,000 cfs can drop approximately 50% to 500 cfs by mid May (DOE 2002). Releasing steelhead (mid-April to early May) during spring river freshets, combined with observed smolt behavior, is an important release consideration. Inter-species density related impacts could be greater toward mid-May as river flows could be only 50 % of observed flows than in mid-April.

Dates of Release: The release date can influence the likelihood that listed species are encountered. There are limited studies on migration timing of naturally produced chinook, but chinook from the Lower Columbia ESU are believed to emigrate over a wide window from March through August. The vast majority of steelhead smolt releases are trucked to a release site for direct release or forced from rearing ponds and raceways. All smolt releases begin on or after April 15. Region 5 staff have been implementing release dates closer to May 1.

Relative Body Size: Studies and opinions on size of predator/prey relationships vary greatly and although there is evidence that salmonids can prey upon fish up to 50% of their body length, most prey consumed is probably much smaller. Keeley and Grant (2001) suggest that the mean prey size for 100-200 mm fl salmonids is between 13-15% of predator body size. Salmonid predators were thought to be able to prey on fish up to approximately 1/3 of their length (USFWS 1994), although coho salmon have been observed to consume juvenile chinook salmon of up to 46% of their total length in aquarium environments (Pearsons et al. 1998). Artic char are well known as piscivorous predators, but recent studies suggest the maximum prey size is approximately 47% of their length (Finstad et al. 2002). The "33% of body length" criterion for evaluating the potential risk of predation in the natural environment has been used by NOAA Fisheries and the USFWS in a number of biological assessments and opinions (c.f., USFWS 1994; NMFS 2002). Although predation on larger chinook juveniles may occur under some conditions, WDFW believes that a careful review of the Pearson and Fritts (1999) study supports the continued use of the "33% of body length criterion" until further data for this system can be collected.

Release Location and Release Type: The likelihood of predation may also be affected by the location and type of release. Other factors being equal, the risk of predation may increase with the length of time that involves co-mingling. In the freshwater environment, this is likely to be affected by distribution of the listed species in the watershed, the location of the release and the speed at which fish released from the program migrate. Fish have been reared and imprinted on Washougal River water. Fish can be trucked further downriver to minimize listed fish impact and have the returning adults home in to the lower river to further benefit harvest. Although trucking of fish is involved, steelhead released to large river systems have been observed to move quickly from the system (Harza, 1999).

Potential Washougal summer steelhead predation and competition effects on listed salmonids: The proposed annual production goal for this program is 60,000 fish with 50% released in the main Washougal and 50% released from the W.F Washougal. Steelhead releases are at 5.0 – 5.5 FPP (206 – 196 mm fl) and can be released starting April 15 although recently, staff has implemented a May 1st release date. Washougal steelhead releases could encounter listed chinook, steelhead and chum in the Washougal River sub-basin and Columbia mainstem. Due to size differences between steelhead smolts and fingerlings, competition is probably low with regards to food and spatial preference between species and size. At 5.0-5.5 FPP (210 –206 mm fl), potential predation on listed chinook would be on fish of 62-64 mm fl and smaller.

Below are some data available for chinook fry and fingerling lengths from Lower Columbia streams:

- Lengths from the Lewis River system during the month of June indicate fish 48-55 mm fl (Columbia River Progress Report 2003-16).
- Average fork length, by week from 26 sampling sites on the Kalama River, indicate

fish 44 mm fl on April 25, 46 mm fl on May 3, 56 mm fl on May 11, 62 mm fl by May 16, and ranges of 70 – 80 mm fl for the month of June and 77—89 mm fl for the month July (R. Pettit, WDFW, 1990).

- Fork lengths from Cedar Creek (tributary to the N.F. Lewis River) indicate that average chinook lengths reach approximately 50 mm fl between the weeks of April 12 and April 19, 2004, with fish 55-60 mm fl by April 26 and May 3, 2004 and fish approaching 70 mm fl by mid-May (Dan Rawding, WDFW, pers. comm. 2004).

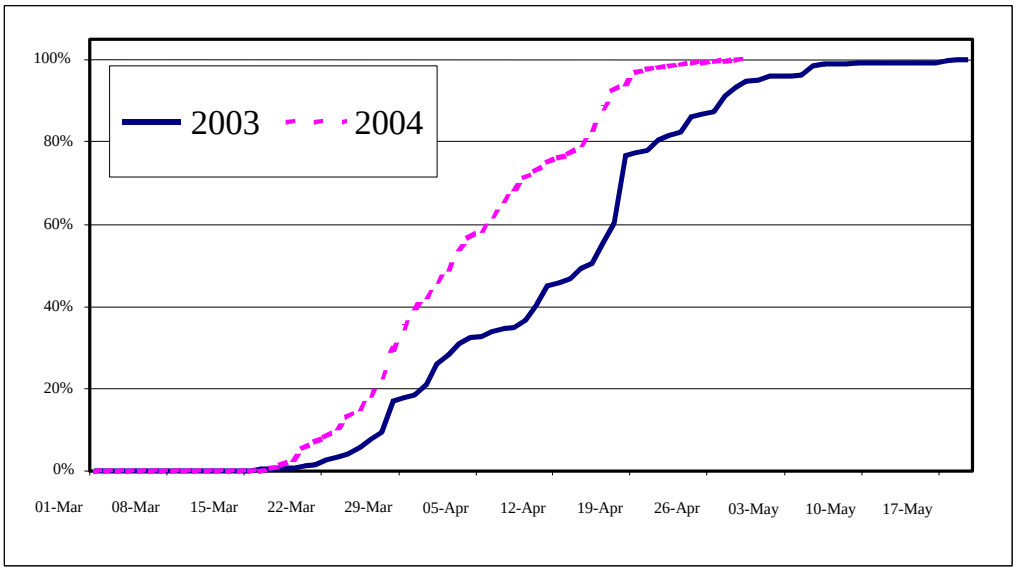
Listed steelhead including emerging fry and migrating yearlings are present in the system. Depending on available temperature units, eggs will hatch in 4-7 weeks with fry emergence approximately 2-3 weeks after hatching (Table 7). Based on the migration and dispersal of the hatchery program, it is likely that this occurs before peak emergence of listed winter steelhead. Summer steelhead emerge approximately one month earlier. Wild steelhead smolts migrate from freshwater to saltwater from March through June. The release of steelhead from this program is low in the system to avoid listed steelhead habitat.

Table 7. Lower Columbia Steelhead Emergence Windows.

Race	Spawn Time	Peak Spawn Window	Incubation to Hatch	Swim-up Window	Swim-up @ 50% Date	Source
Winter	March – May	April 15 - 25th	May 13 – June 15	May 27-July 7	June 17	LCSI Draft 1998
Summer	February – April	March 20-30th.	April 14 – May 18	April 28 – June 2	May 15	Kalama River Research Report

For chum impact, mean lengths from the Grays River Hatchery and Sea Resources (Chinook River) Chum Recovery programs indicate chum releases are: 56.2 – 58.8 mm fl (in mid-March), 55.2 mm fl (late March), and 54.6 mm fl in mid-April (Lower Columbia Chum HGMP 2004). For the Duncan Creek and Ives Island Chum Recovery programs, fish are released at 1.0-1.5 grams or 50-55 mm fl on a staggered basis from mid-March through May (Bonneville Population of Columbia River Chum Salmon HGMP 2004). Additionally, 95% of the chum emigration was completed by May 1 (2003) and by April 22 (2004). The steelhead implementation release date towards May is meant to allow dispersal of chum by this time.

Figure 1. Chum salmon out migration timing at Duncan Creek for Brood Year 2002 & 2003



Listed coho (proposed):
Current lengths and data for listed coho in the Lower Columbia ESU is unknown. Depending on water temperatures, hatchery coho fry during the month of April can range from 42 – 40 mm fl and be 50 mm fl by the first of May (Washougal Hatchery coho growth data 2004). Indirect take from competition or predation is unknown.

Residualism:

- To maximize smolting characteristics and minimize residual steelhead, WDFW adheres to a combination of acclimation, volitional release strategies, active pond management, size, and release guidelines (Steelhead Guidelines, July 2001).
- Condition factors, including a lean .90-.99 K factor, and co-efficient of variation (CVs) of less than 10% are steelhead rearing parameters.
- Steelhead release programs practice active pond management to remove fish less than 180 mm fl and greater than 250 mm fl on release (Steelhead Guidelines, July 2001). Indirect take from residualism is unknown.

Migration Corridor/Ocean: Once in the mainstem, Witty et al. (1995) concluded that predation by hatchery-origin fish on wild salmonids does not significantly impact natural-origin fish survival in the Columbia River migration corridor. He also stated there are no studies demonstrating that numbers of Columbia River system smolts emigrating to the ocean can be associated with a change in the survival rates of juveniles in the ocean in part because of the dynamics of fish rearing conditions in the ocean.

Monitoring:

Associated monitoring Activities: The following monitoring baseline activities are conducted in the Lower Columbia Management Area (LCMA) for adult steelhead and salmon: redd surveys are conducted for winter steelhead in the SF Toutle, Coweeman, EF Lewis and Washougal rivers. Redd surveys are also conducted in the Cowlitz River for fall and spring chinook. Mark-recapture surveys provide data for summer steelhead populations in the Wind and Kalama rivers. Mark-recapture carcass surveys are conducted to estimate populations of chinook salmon in Grays, Elochoman, Coweeman, SF Toutle, Green, Kalama, NF Lewis, and EF Lewis rivers and Skamokawa, Mill, Abernathy, and Germany creeks and for all chum salmon populations.

Snorkel surveys are conducted for summer steelhead in the EF Lewis and Washougal rivers. Trap Counts are conducted on the Cowlitz, NF Toutle, Kalama, and Wind rivers and on Cedar Creek, a tributary of the NF Lewis River. Area-Under-the-Curve (AUC) surveys are conducted to collect population data for chum salmon in Grays River and Hardy and Hamilton creeks. All sampling of carcasses and trapped fish include recovery of coded wide tagged (CWT) fish for hatchery or wild stock evaluation. Downstream migrant trapping occurs on the Cowlitz, Kalama, NF Lewis and Wind rivers, Cedar Creek, and will expand to other basins as part of a salmonid life cycle monitoring program to estimate freshwater production and wild smolt to adult survival rates. Any take associated with monitoring activities is unknown but all follow scientific protocols designed to minimize impact.

Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

In other HGMPs provided to NOAA (Puget Sound, Upper Columbia), indirect takes from hatchery releases such as predation and competition is highly uncertain and dependant on a multitude of factors (i.e. data for population parameters - abundance, productivity and intra species competition) and although HGMPs discuss our current understanding of these effects, it is not feasible to determine indirect take (genetic introgression, density effects, disease, competition, predation) due to these activities. See take tables at the end of this document.

Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.

Any additional mortality from this operation on a yearly basis would be communicated to WDFW Fish Program staff for additional guidance. For other listed species, if significant numbers of wild salmonids are observed impacted by this operation, then staff would inform the WDFW District Biologist, Fish Health Specialist or Area Habitat Biologist who, along with the Hatchery Complex Manager, would determine an appropriate plan and consult with NOAA Fisheries for adaptive management review and protocol.

Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish.

No data available.

Section 3: Relationship of Program to Other Management Objectives

3.1 Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the *NPPC Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

The production developed for this program will be integrated with *U.S. v Oregon* and the Columbia River Fish Management Plan (CRFMP) and with hatchery plans documented in WDFW's yearly Future Brood Document (FBD), and Lower Columbia Fisheries Management and Evaluation Plan (2002 FMEP) which has been agreed to by NOAA for listed steelhead, chum, and chinook in the ESU. WDFW hatchery programs in the Columbia system adhere to a number of guidelines, policies and permit requirements in order to operate. These constraints are designed to limit adverse effects on cultured fish, wild fish and the environment that might result from hatchery practices. Following is a list of guidelines, policies and permit requirements that govern WDFW Columbia hatchery operations:

Genetic Manual and Guidelines for Pacific Salmon Hatcheries in Washington. These guidelines define practices that promote maintenance of genetic variability in propagated salmon (Hershberger and Iwamoto 1981). Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).

Spawning Guidelines for Washington Department of Fisheries Hatcheries. Assembled to complement the above genetics manual, these guidelines define spawning criteria to be used to maintain genetic variability within the hatchery populations (Seidel 1983). Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 7, IHOT 1995).

Stock Transfer Guidelines. This document provides guidance in determining allowable stocks for release for each hatchery. It is designed to foster development of locally-adapted broodstock and to minimize changes in stock characteristics brought on by transfer of non-local salmonids (WDF 1991).

Fish Health Policy in the Columbia Basin. Details hatchery practices and operations designed to stop the introduction and/or spread of any diseases within the Columbia Basin. Also, *Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries* (Genetic Policy Chapter 5, IHOT 1995).

WDFW Steelhead Rearing Guidelines. Details rearing guidelines and rearing parameters statewide (July 31, 2001).

National Pollutant Discharge Elimination System Permit Requirements This permit sets forth allowable discharge criteria for hatchery effluent and defines acceptable practices for hatchery operations to ensure that the quality of receiving waters and ecosystems associated with those waters are not impaired.

3.2 List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

The program described in this HGMP is consistent with the following agreements and plans:

- The Columbia River Fish Management Plan

- U.S. vs. Oregon court decision
- Production Advisory Committee (PAC)
- Technical Advisory Committee (TAC)
- Integrated Hatchery Operations Team (IHOT) Operation Plan 1995 Volume III.
- Pacific Northwest Fish Health Protection Committee (PNFHPC)
- In-River Agreements: State, Federal, and Tribal representatives
- Northwest Power Planning Council Sub Basin Plans
- Washington Department of Fish and Wildlife Wild Salmonid Policy
- Lower Columbia Steelhead Conservation Initiative

Constraints on this facility relative to the IHOT Operation Plan are described in the Hatchery Evaluation Report Skamania Hatchery- Summer Steelhead 1997. The Clark Public Utility and the Department of Fish and Wildlife have a partnership (MOA) at the Vancouver Hatchery that provides rearing and incubation for the Skamania Winter Steelhead program. The Vancouver Hatchery provides pathogen free water that provides IHN virus protection for Skamania Winter Steelhead during spring time rearing activities.

3.3 Relationship to harvest objectives.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

Selective fisheries were initiated for steelhead in 1986 in the Lower Columbia River tributaries. This regulation requires the release of all wild steelhead. The estimated mortality for wild winter steelhead for these fisheries in lower Columbia River tributaries ranges from 4% to less than 7% per basin depending on the fishing regulations. Harvest rates have been as high as 70% for hatchery steelhead in the Cowlitz River. No directed fisheries target Washougal summer steelhead; incidental mortality can occur during the Columbia River fall commercial and summer sport fisheries. Summer steelhead sport harvest in the Washougal River from 1964-1990 ranged from 272 to 5,699; average annual sport harvest from 1983-1990 was 1,560 fish; since 1986, regulations limit harvest to hatchery fish only. ESA limits fishery impact on wild Washougal summer steelhead to 2 % per year. Until wild steelhead populations have recovered, wild steelhead release regulations will be in effect with incidental mortality limited to less than 7% on wild stocks. The harvest rate of hatchery fish is expected to remain greater than 40% for most stocks.

Return Year	Sport Harvest Hatchery STHD
1990/91	2,023
1991/92	1,522
1992/93	1,593
1993/94	667
1994/95	250
1995/96	561
1996/97	172
1997/98	66
1998/99	166
1999/00	876
2000/01	1,002
2001/02	1,023
Average	827

3.4 Relationship to habitat protection and recovery strategies.

Sub-basin Planning and the Lower Columbia Fish Recovery Board (LCFRB)
The current Washougal HGMP processes are designed to deal with existing hatchery programs and potential reforms to those programs. A regional sub-basin planning process (Draft Washougal River Sub-basin Summary May 17, 2002 and May 2004) is a broad-scale initiative that will provide building blocks of recovery plans used by the Lower Columbia Fish Recovery Board (LCFRB) for listed fish and may well use HGMP alternative ideas on how to utilize hatchery programs to achieve objectives and harvest goals. In order to assess, identify and implement restoration, protection and recovery strategies, Region 5 staff is involved in fish and wildlife planning and technical assistance in concert through the LCFRB including the role of fish release programs originating from WDFW Region 5 hatcheries.

Habitat Treatment and Protection
WDFW is presently conducting or has conducted habitat inventories within the Washougal sub-basin. Ecosystem Diagnosis and Treatment (EDT) compares habitat today to that of the basin in a historically unmodified state. It creates a model to predict fish population outcomes based on habitat modifications. WDFW is also conducting a Salmon Steelhead Habitat Inventory Assessment Program (SSHIAP) that documents barriers to fish passage. WDFW's habitat program issues hydraulic permits for construction or modifications to streams and wetlands. This provides habitat protection to riparian areas and actual watercourses within the watershed.

Limiting Factors Analysis
A WRIA 28 (Salmon-Washougal River) habitat Limiting Factors Analysis (LFA) has been completed by the Washington State Conservation Commission with the input from WDFW Region 5 staff. Past natural and anthropogenic disturbances have had significant impacts on habitat conditions within the sub-basin. The Yacolt Burn, forestry practices, splash and hydroelectric dams, road construction, mining, residential and industrial development, water withdrawals, and industrial pollution from paper mills have all altered habitat conditions within the sub-basin. While some habitat conditions have improved over time, other habitat conditions have been much slower to recover from past impacts. Many reaches of the mainstem Washougal and its tributaries still lack adequate structural large woody debris (LWD), spawning gravels, and quality pool habitat. Culverts and dams still block passage to critical and very limited tributary habitat. Roads continue to alter riparian function and stream hydrology, and contribute fine sediments to spawning gravels. Water withdrawals continue to limit available spawning and, especially, rearing habitat within the sub-basin. Development continues to reduce critical floodplain and riparian functions.

3.5 Ecological interactions.

Below are discussions on both negative and positive impacts relative to the Washougal summer steelhead program and are taken from the Puget Sound listed and non-listed HGMP template (WDFW and NOAA 2003).

(1) Salmonid and non-salmonid fishes or species that could negatively impact the program: Washougal steelhead smolts can be preyed upon through the entire migration corridor from the river sub-basin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays, as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons in the Columbia mainstem sloughs, can prey on steelhead smolts. Mammals that can take a heavy toll on migrating smolts and returning adults include: harbor seals, sea lions, river otters and Orcas.

(2) Salmonid and non-salmonid fishes or species that could be negatively impacted by the program: Co-occurring natural salmon and steelhead populations in local tributary areas and the

Columbia River mainstem corridor areas could be negatively impacted by program fish. Of primary concern are the ESA listed endangered and threatened salmonids: Snake River fall-run Chinook salmon ESU (threatened); Snake River spring/summer-run Chinook salmon ESU (threatened); Lower Columbia River Chinook salmon ESU (threatened); Upper Columbia River spring-run Chinook salmon ESU (endangered); Columbia River chum salmon ESU (threatened); Snake River sockeye salmon ESU (endangered); Upper Columbia River steelhead ESU (endangered); Snake River Basin steelhead ESU (threatened); Lower Columbia River steelhead ESU (threatened); Middle Columbia River steelhead ESU (threatened); and the Columbia River distinct population segment of bull trout (threatened). Listed fish can be impacted through a complex web of short and long term processes and over multiple time periods which makes evaluation of this net effect difficult. WDFW is unaware of studies directly evaluating adverse ecological effects to listed salmon. See also Section 2.2.3 Predation and Competition.

3) Salmonid and non-salmonid fishes or other species that could positively impact the program. Multiple programs including fall chinook and coho programs are released from the Washougal Hatchery and limited natural production of chinook, coho, chum and steelhead occurs in this system along with non-salmonid fishes (sculpins, lampreys and sucker etc.).

4) Salmonid and non-salmonid fishes or species that could be positively impacted by the program. Washougal steelhead smolts can be preyed upon through the entire migration corridor from the river sub-basin to the mainstem Columbia River and estuary. Northern pikeminnows and introduced spiny rays in the Columbia mainstem sloughs can prey on steelhead smolts as well as avian predators, including gulls, mergansers, cormorants, belted kingfishers, great blue herons and night herons. Mammals that benefit from migrating smolts and returning adults include: harbor seals, sea lions, river otters and Orcas. Except for yearling coho and steelhead, these species may serve as prey items during emigration through the basin. Hatchery fish provide an additional food source to natural predators that might otherwise consume listed fish and may overwhelm established predators providing a beneficial, protective effect to co-occurring wild fish. Hatchery releases can also behaviorally encourage mass emigration of multiple species through the watershed, reducing residency. Many watersheds in the Pacific Northwest appear to be nutrient-limited (Gregory et al. 1987; Kline et al. 1997) and salmonid carcasses can be an important source of marine derived nutrients (Levy 1997). Carcasses from returning adult salmonids have been found to elevate stream productivity through several pathways, including: 1) the releases of nutrients from decaying carcasses has been observed to stimulate primary productivity (Wipfli et al. 1998); 2) the decaying carcasses have been found to enrich the food base of aquatic invertebrates (Mathisen et al. 1988); and 3) juvenile salmonids have been observed to feed directly on the carcasses (Bilby et al. 1996). Addition of nutrients has been observed to increase the production of salmonids (Slaney and Ward 1993; Slaney et al. 2003; Ward et al. 2003). The Washougal River drainage is thought to be in-adequately seeded with anadromous fish carcasses and a program has been initiated with the use of volunteers (Lower Columbia Fishery Enhancement Group, Camas Washougal Fish and Habitat League) to distribute steelhead carcasses when needed. Assuming limited non-successful spawning, up to 1,000 adult carcasses could contribute approximately 10,000 pounds of marine derived nutrients to organisms in the Washougal River.

Section 4. Water Source

4.1 Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile and natural limitations to production attributable to the water source.

Water rights total 11,670 gpm from two sources: West Fork Washougal River and Vogel Creek. The Washougal River provides most water used. Actual water use averages 9,800 gpm and ranges from 6,650 to 11,460 gpm. Vogel Creek water is used for incubation and early rearing while Washougal River water is used thereafter until spring release. Two surface water sources may be used for adult holding- N.F Washougal River and Vogel Creek water. Vogel Creek water is only used for adult holding under low flow/drought conditions. Adult holding water is re-use water flowing from rearing units.

4.2 Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Hatchery water withdrawal	Water for raceways are diverted from the W.F. Washougal River while incubation and the hatchery building is supplied from Vogal Creek and are formalized through trust water right #S2-*12684 from the Department of Ecology. Monitoring and measurement of water usage is reported in monthly NPDES reports (see below).
Intake/Screening Compliance	Intake structures were designed and constructed to specifications at the time the Washougal facility was constructed. The Mitchell Act Intake and Screening Assessment (2002) identified design and alternatives needed to get the existing structures in compliance, including Skamania Hatchery. Intake screens (3/32 inch wide x 11/4 inch long) and velocity sweeps may not be compliant with NOAA fish screening standards. From the assessment, WDFW has been requesting funding for future scoping, design, and construction of a new intake system. In 2003, Otak Inc was contracted to provide options for a fish barrier design on the West Fork of the Washougal River. In 2004, a preferred alternative will be recommended.
Hatchery effluent discharges. (Clean Water Act)	This facility operates under the "Upland Fin-Fish Hatching and Rearing" National Pollution Discharge Elimination System (NPDES) general permit which conducts effluent monitoring and reporting and operates within the limitations established in its permit administered by the Washington Department of Ecology (DOE). WAG 13-1044. Monthly and annual reports on water quality sampling, use of chemicals at this facility, compliance records are available from DOE. Discharges from the cleaning treatment system are monitored as follows: *Total Suspended Solids (TSS)*C1 to 2 times per month on composite effluent, maximum effluent and influent samples. *Settleable Solids (SS)*C1 to 2 times per week on effluent and influent samples. *In-hatchery Water Temperature* - daily maximum and minimum readings.

Section 5. Facilities

5.1 Broodstock collection facilities (or methods).

A fish ladder approximately 80' long leads from the West Fork Washougal River to a 20' X 20' trap area where returning fish are routed to one of the three holding ponds. All flow for these ponds and the fish ladder is re-use water from the raceways. The Skamania facility does not have a barrier at the entrance to the fish ladder and a portion of the hatchery fish could pass up-stream during the winter and spring migration periods.

Ponds (number)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
3	Concrete Raceway	8100	135	12.5	5.0	3333

5.2 Fish transportation equipment (description of pen, tank, truck, or container used).

The Skamania Hatchery has two fish transport trucks. One 1979 Chevrolet 1,500 gallon tanker truck and one 1991 International 2,000 gallon tanker truck. The International has the capacity for hauling and off-loading brood fish. Plans are to develop an overhead crane loading system using a water-to-water container for loading fish for re-cycle to the fishery downstream.

5.3 Broodstock holding and spawning facilities.

Three concrete raceways 12' X 135' X 3.5' (5,606 cubic foot) each are used for holding brood fish. These holding ponds have a covered building over the center portion for sorting and spawning adult fish. These ponds are very effective at holding summer steelhead with annual mortality at less than 1%. All flow for these ponds and the fish ladder is re-use water from the raceways. Integrated Hatchery Operations Team (IHOT) adult holding guidelines followed for adult holding, density, water quality and predator control measures to provide the necessary security for the broodstock.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
3	Concrete Raceway	8100	135	12.5	5.0	3333

5.4 Incubation facilities.

Incubator Type	Units (number)	Flow (gpm)	Volume (cu.ft.)	Loading-Eyeing (eggs/unit)	Loading-Hatching (eggs/unit)
Skamania Hatchery-Shallow Troughs (5 cells/trough)	60 Shallow Troughs	10	60	150000	20000
Vancouver Hatchery-Shallow Troughs (5 cells/trough)	25 Shallow Troughs	7	60	nya	20000

All steelhead eggs are incubated in shallow trough baskets. A portion of the building is isolated with plastic curtains for eyeing eggs by take (time of egg take).

5.5 Rearing facilities.

The rearing facilities consist of 64 shallow troughs, six indoor 135 cubic foot fiberglass tanks, thirty-two 1,913 cubic foot concrete raceways and ten 216 cubic foot concrete raceways.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Flow (gpm)	Max. Flow Index	Max. Density Index
60	Shallow Troughs (Post emergence Rearing)- Skamania Hatchery	60	nya	nya	nya	10	1.6	0.3
6	Fiberglass - Skamania Hatchery	90	15	3.0	2.0	40	1.6	0.3
10	Concrete Raceways- Skamania Hatchery	210	35	4.0	1.5	75	1.6	0.3
32	Concrete Raceways- Skamania Hatchery	1800	80	10	2.25	300	1.6	0.3

5.6 Acclimation/release facilities.

Release facilities are the same. See HGMP Section 5.5.

Fish released at Skamania are acclimated throughout the incubation and rearing time at the hatchery. Direct releases occur at the Klickitat, Drano Lake and E.F. Lewis River sites. Fish released on the Kalama River are transferred in late fall/early winter and are acclimated at Kalama No. 2 (Fallert Creek Hatchery). Fish are transferred to the Green and S.F. Toutle River sites for final acclimation before release in those systems.

5.7 Describe operational difficulties or disasters that led to significant fish mortality.

Operational - Winter ice, snow, slush ice and high water events can interrupt flow. Personnel are available 24 hours a day to handle these problems. Bird predation is also a problem and the facility is in process of resolving the problem.

Disease – Virus (IHN) problems have led to quarantine and significant removal of eggs or fish from the system. Fish or eggs are buried and limed.

5.8 Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

- Staff is available 24/7
- Emergency procedures and plans are in place.
- All water and electrical systems are alarmed in case of failure.
- IHOT fish health guidelines are followed.
- As for the threat of a virus outbreak, we have very strict disinfection procedures and comprehensive lab analysis of all egg takes for culling, if needed.

Section 6. Broodstock Origin and Identity

6.1 Source.

The Skamania Hatchery summer steelhead stock was derived from wild fish taken from the Washougal and Klickitat rivers. For decades the Skamania Hatchery summer steelhead broodstock has been obtained directly from adults returning to the hatchery.

6.2.1 History.

The first fish captured at the Skamania Hatchery for broodstock occurred in 1956. The first returns of wild fish reared at the hatchery returned in 1959. The Skamania Hatchery has been stocking hatchery steelhead into the river system since the late 1950's.

Broodstock Source	Origin	Year(s) Used	
		Begin	End
Washougal River Summer Steelhead	N	1956	U
Klickitat River Summer Steelhead	N	U	U
Skamania Hatchery Summer Steelhead	H	1959	Present

6.2.2 Annual size.

The average hatchery return over the past 9 years has been 1653 fish with the highest year in 1992 (5173 fish) and the lowest year being 1999 with an estimated 600 fish. The sex ratio for Skamania Summer Steelhead is typically 45% males and 55% females. A comprehensive view of adult fish returns is found in the " Preliminary Stock Status For Steelhead in the Lower Columbia River, Washington, November 1997, WDFW".

The total run (escapement plus catch) has exceeded the 1000 fish per generation criteria in all years over the past decade.

6.2.3 Past and proposed level of natural fish in the broodstock.

Since initial wild stock usage, since 1986 only hatchery origin returning broodstock have been used for propagation purposes and have identified by their missing adipose fin. No natural fish are currently incorporated into the broodstock program.

6.2.4 Genetic or ecological differences.

Skamania summer steelhead pool with wild summer steelhead from the Lower Columbia River. The difference in spawn timing (3 months earlier for Skamania hatchery fish), poor reproductive success for these fish in the wild (Hulett et al. 1998) and spatial separation at spawning have helped to maintain genetic differences between hatchery and wild fish. Fish are released as age-1+ smolts whereas wild steelhead are predominantly age-2+ smolts. Out-migration timing for both life history types is similar but is slightly earlier for the hatchery component (Fuss et. al. 1998).

6.2.5 Reasons for choosing.

For decades the Skamania Hatchery summer steelhead broodstock has been obtained directly from adults returning to the hatchery. There has been a long history of adaptation of the stock to the Skamania facility contributing to the success of the summer steelhead program.

6.3 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

- Only hatchery stock is used.
- Timing is separated from natural steelhead.
- Holding pond procedures follow IHOT guidelines.
- Other listed fish, if identified, will be released immediately if encountered during the broodstock collection process.

Section 7. Broodstock Collection

7.1 Life-history stage to be collected (adults, eggs, or juveniles).

Adults arriving at Skamania Hatchery

7.2 Collection or sampling design

Because hatchery fish have been fin marked at Skamania for over ten years the brood stock selection is considered all from hatchery fish. The intent of the adult collection procedures at Skamania Hatchery is to collect enough adults to maintain the hatchery production program. Hatchery fish enter the sub-basin from April through September with a peak in June/July. Adults captured are spawned at the hatchery while some portion of the run may pass the fishway and escape to the upper portion of the North Fork Washougal River where a considerable sport harvest occurs. Wild fish (with adipose fin) that become trapped are transported up-stream or directly released for up-stream passage. The Skamania Hatchery has no weir for trapping. Attributes critical to long-term fitness of the stock are retained since adult broodstock are randomly selected over the entire run entry pattern based on program protocols and guidelines set forth by program/agency geneticists.

7.3 Identity.

All hatchery-origin Skamania summer steelhead are adipose fin clipped. Only adipose fin-clipped adults are used for broodstock. Presently, adult broodstock are randomly selected over the entire run entry pattern based on program protocols and guidelines set forth by program/agency geneticists.

7.4 Proposed number to be collected:

7.4.1 Program goal (assuming 1:1 sex ratio for adults):

200 males and 200 females

7.4.2 Broodstock collection levels for the last twelve years (e.g. 1990-2001), or for most recent years available.

Egg losses have ranged from 9.5% to 21.0 % in past years. This does not include potential IHN positive eggs that need to be destroyed. Extra eggs can be taken to cover potential IHN positive eggs. In some years, shortages are made up with IHN negative eggs from Merwin Hatchery. Broodstock are collected to cover program goals for plants made in the Washougal River plus the out-plants that originate from this facility.

Year	Broodstock Used		Eggs taken
	Females	Males	
1995	285	293	855,000
1996	430	387	1,375,600
1997	461	461	1,844,000
1998	258	263	875,000
1999	167	167	617,000
2000	Na	Na	632,000
2001	301	301	1,255,659
2002	229	226	988,409
2003	224	229	898,000

7.5 Disposition of hatchery-origin fish collected in surplus of broodstock needs.

All hatchery steelhead in surplus of broodstock needs are recycled back to river, planted into lakes (sport harvest) or used for food banks.

7.6 Fish transportation and holding methods.

Ponds (No.)	Pond Type	Volume (cu.ft)	Length (ft.)	Width (ft.)	Depth (ft.)	Available Flow (gpm)
3	Concrete Raceway	8100	135	12.5	5.0	3333

Broodstock is collected and held in a manner that results in less than 10% pre-spawning mortality. The first adult summer steelhead begin arriving at Skamania Hatchery in May and are held until December before spawning begins. Pre-spawning mortality is typically 1 to 2 %. Two surface water sources may be used for adult holding- N.F Washougal River and Vogel Creek water. Vogel Creek water is only used for adult holding under low flow/drought conditions. Adult holding water is re-use water flowing from rearing units.

7.7 Describe fish health maintenance and sanitation procedures applied.

The adult holding area is separated from all other hatchery operations. All equipment and personnel use disinfection (chlorine) procedures upon entering or exiting the area. Fish treatments are for fungus control using formalin bath treatments.

7.8 Disposition of carcasses.

Carcasses fit for human consumption are donated to local food banks. Treated carcasses are taken to a local rendering plant. Recycling of early returning adults for additional sport harvest opportunity downriver or in landlocked lakes are options if returns to the hatchery are great enough.

7.9 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

- No listed natural fish are used for broodstock collection.
- Timing is separated from listed fish
- Holding pond procedures follow IHOT guidelines.
- Broodstock collection and sorting procedures can quickly identify non-target listed fish if encountered

Section 8. Mating

8.1 Selection method.

Spawning occurs (95%) in December and January. Each week's egg take will be represented in the production. Males and females available on a given day are mated randomly. Broodstock for this program arrives from October through December. Spawners are selected and mated randomly from the population maintained in the hatchery holding pond. Fish are spawned through this period to help ensure that the run timing for the isolated stock is maintained. In 2003 eggs were taken on 11/25, 12/31 & 1/31/03.

8.2 Males.

Spawning protocol as described in the IHOT 1995 Volume III. The intent is to utilize a spawning population of at least 200 adults and spawn fish at a 1:1 male-to-female ratio. However, difficulty in obtaining sperm may sometimes result in using two males per female. The availability of jacks in the population is usually very insignificant, but when available, jacks can be used up to 2.0% of the total male population. Males can be lived spawned.

8.3 Fertilization.

Disinfection procedures that prevent pathogen transmission between stocks of fish are implemented during spawning. Spawning implements are rinsed with an iodophor solution, and spawning area and implements are disinfected with iodophor solution at the days end of spawning. Fertilization occurs at a 1:1 ratio (females/males). Ovarian fluid is not drained prior to fertilization. Water hardening procedures with iodophor are followed. All implements are rinsed/washed with iodophor solution at the end of the days spawning activities.

8.4 Cryopreserved gametes.

Cryopreserved gametes are not used.

8.5 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

- No listed natural fish are used for broodstock collection.
- Timing is separated from listed fish
- Broodstock collection and sorting procedures can quickly identify non-target listed fish if encountered

Section 9. Incubation and Rearing.

9.1.1 Number of eggs taken and survival rates to eye-up and/or ponding.

Below, numbers reflect the total eggs taken and incubated to cover program goals for plants made in the Washougal River plus outplants that originate from this facilityEggs take goal is 400,000 (FBD 2004). Due to IHN possibilities excess eggs are taken to safeguard against potential viral and incubation/rearing losses as viral problems can be significant. In 2002, 794,079 eggs were destroyed (66% of the eyed egg total). Backup steelhead eyed eggs from Merwin Hatchery are used to replace program shortages if and when needed. In 2002, 93,500 clean eggs from Merwin were transferred to Skamania. 50% of the Skamania summer steelhead eggs are incubated from eyed through hatching at the Skamania Hatchery and the other 50% of the Skamania summer steelhead eggs are transferred and incubated at the Vancouver Hatchery.

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Egg Survival Perfor-mance Std.	Fry-fingerling Survival (%)	Rearing Survival Perfor-mance Std.	Fingerling-Smolt Survival (%)
1995	1870326	87.6	98.6	90	96.6	90	93.6
1996	1928449	93.1	96.0	90	99.0	90	94.0
1997	1034175	92.3	94.5	90	93.5	90	95.8
1998	765494	86.9	97.4	90	95.7	90	96.3
1999	655582	83.7	98.0	90	94.0	90	98.3
2000	673409	90.0	97.0	90	99.0	90	94.9
2001	537117	90.5	98.0	90	98.6	90	84.0
2002	988,409	Na	Na	Na	Na	Na	Na
2003	898.000	Na	Na	Na	Na	Na	Na

Egg take goal for 2004 is 450,000 (FBD). The program goal for green egg-to-fry survival is 90%.

9.1.2 Cause for, and disposition of surplus egg takes.

BKD and viral sampling lots (60 fish lots) are conducted over the course of the season. Lots of eggs are removed with unacceptable levels of BKD. Due to IHN possibilities excess eggs are taken to safeguard against potential incubation/rearing losses. Eggs with high to mid-level titers are selective culled and destroyed. In 2002 70% of the eggs had to be destroyed (794,909).

9.1.3 Loading densities applied during incubation.

Summer steelhead eggs range in size from 2,800 eggs/lb to 3,000 eggs/lb. Standard loading of eyed eggs per shallow trough basket is 20,000. Trough flow is varied from 8 to 12 gallons per minute (gpm) depending on the stage of the egg or fry.

9.1.4 Incubation conditions.

50% of the Skamania summer steelhead eggs are incubated from eyed through hatching at the Skamania Hatchery and the other 50% of the Skamania summer steelhead eggs are transferred and incubated at the Vancouver Hatchery. Standard low-level alarms are present in the hatchery

and water temperatures are recorded using Tidbit temperature loggers. Silt management is usually not necessary and influent and effluent gas concentrations, including dissolved oxygen, are within optimal parameters for salmonid egg and juvenile survival.

At Vancouver, eggs are incubated in shallow troughs with water from one on-station well and spring water. For Skamania, flow to the incubation room is from Vogle Creek. Silt in this water source is a common occurrence during rain events and is handled by standard daily trough cleaning techniques while eggs are monitored to determine fertilization and mortality. The water temperature is monitored continuously with a thermograph and recorded while temperature units (TU) are tracked for embryonic development. Although water is saturated with oxygen at 12 ppm, dissolved oxygen content is monitored and has been at acceptable levels (minimum criteria of 8 parts per million (ppm)). When using artificial substrate, vexar or bio-rings, egg densities within incubation units are reduced by 10%. Disinfection procedures are implemented during incubation that prevents pathogen transmission between stocks of fish on site.

9.1.5 Ponding.

Initial feeding and early rearing occurs in the incubation troughs. Ponding / feeding begins on a volitional basis when the fry are 100% at the swim-up stage. At this point very little, if any, yolk sack will be present. Fry are ponded when the yolk slit is approximately 1 millimeter wide (approximately 1600 TU's) or based on (95% yolk absorption) KD factor. At this time fry are introduced feed in the shallow troughs (See HGMP Section 5.5 for trough specifications) during the last two weeks of March. Fish are fed in indoor troughs until early July, when they will be ponded into outdoor raceways.

9.1.6 Fish health maintenance and monitoring.

Staff conducts daily inspection, visual monitoring and sampling from eyed egg, fry, fingerling and sub-yearling stages. As soon as potential problems are seen, these concerns are immediately communicated to the WDFW fish health specialist. In addition, fish health specialists conduct inspections monthly. Potential problems are managed promptly to limit mortality and reduce possible disease transmission. Formalin (37% formaldehyde) is dispensed into water for control of ecto-parasites on juvenile fish and for fungus control on eggs. Egg mortality ranges from 6 to 16 % and all eggs are processed through an automated egg picking machine and to some degree by hand.

9.1.7 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

All eggs incubated are from hatchery-origin marked adults only.

9.2.1 Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1990-2001), or for years dependable data are available.

Year	Egg Take	Green-Eyed Survival (%)	Eyed-Ponding Survival (%)	Egg Survival Perfor-mance Std.	Fry-fingerling Survival (%)	Rearing Survival Perfor-mance Std.	Fingerling-Smolt Survival (%)
1995	1870326	87.6	98.6	90	96.6	90	93.6
1996	1928449	93.1	96.0	90	99.0	90	94.0
1997	1034175	92.3	94.5	90	93.5	90	95.8
1998	765494	86.9	97.4	90	95.7	90	96.3
1999	655582	83.7	98.0	90	94.0	90	98.3
2000	673409	90.0	97.0	90	99.0	90	94.9
2001	537117	90.5	98.0	90	98.6	90	84.0

9.2.2 Density and loading criteria (goals and actual levels).

The fish are reared using the loading densities recommended by Piper (1982). In all facilities within Washougal Complex, densities are kept at or below 3.3 lbs /gpm and 0.5 lbs /cu ft. before the last loading reduction in the fall of the year. Trough maximum loading is 40 lbs at 12 gpm (3.33 lbs/gpm). Tank and raceway maximum loading for early rearing is 132 lbs for the tanks at 40 gpm (3.3 lbs/gpm) and 800 lbs per raceway at 300 gpm.(2.66 lbs/gpm). The final loading per raceway is approximately 3200 lbs. at 300 gpm (10.6 lbs/gpm).

9.2.3 Fish rearing conditions.

Environmental parameters: flow rates, water temperatures, dissolved oxygen and Total Settable Solids (TSS) are monitored on a routine basis thru the rearing period. All ponds are broom cleaned every other day and pressure washed between broods. The raceways are not covered to protect the fish from birds and we see the effects in fish loss. We use demand feeders on all raceways throughout the fall and winter months.

9.2.4 Indicate biweekly or monthly fish growth information (average program performance), including length, weight, and condition factor data collected during rearing, if available.

Rearing Period	Length (mm)	Weight (fpp)	Condition Factor	Growth Rate	Hepatosomatic Index	Body Moisture Content
April	36	1000	nya	0.54	nya	nya
May	46	400	nya	0.60	nya	nya
June	64	175	nya	0.56	nya	nya
July	80	90	nya	0.48	nya	nya
August	101	45	nya	0.50	nya	nya
September	139	17	nya	0.63	nya	nya
October	153	13	nya	0.23	nya	nya
November	167	10	nya	0.23	nya	nya
December	173	9.0	nya	0.10	nya	nya
January	180	8.0	nya	0.11	nya	nya
February	188	7.0	nya	0.12	nya	nya
March	198	6.0	nya	0.14	nya	nya

9.2.5 Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

See HGMP Section 9.2.4. No energy reserve data is available.

9.2.6 Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs/gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Rearing Period	Food Type	Application Schedule (#feedings/day)	Feeding Rate Range (%B.W./day)	Lbs. Fed Per gpm of Inflow	Food Conversion During Period
March-July	BioDiet	8	3.0-4.0	0.1	1.2
August-September	Moore Clark Nutra	6	2.0-2.5	nya	0.80
October-December	Moore Clark Nutra	Demand	1.0-1.5	nya	1.0
January-April	Moore Clark Nutra	Demand	0.5-1.0	0.06	1.1

9.2.7 Fish health monitoring, disease treatment, and sanitation procedures.

Monitoring	A fish health specialist inspects fish monthly at Skamania and Vancouver hatcheries and checks both healthy and, if present, symptomatic fish. Based on pathological or visual signs by the crew, age of fish and the history of the facility, the pathologist determines the appropriate tests. External signs such as lesions, discolorations, and fungal growths will lead to internal examinations of skin, gills and organs. Kidney and spleen are checked for bacterial kidney disease (BKD). Blood is checked for signs of anemia or other pathogens. Additional tests for virus or parasites are done if warranted.
Disease Treatment	Bacterial cold water disease (*Flavobacteriosis*) can occur mid-summer with Florfenicol used. IHN can occur from mid-summer to fall. Loss of fish to IHN in 2002 was 6% of the summer steelhead population. Significant losses to IHN have occurred. Mortality is collected and disposed of at a landfill. Fish health and or treatment reports are kept on file.
Sanitation	All eggs brought to the facility are surface-disinfected with iodophor (as per disease policy). All equipment (nets, tanks, boots, etc.) is disinfected with iodophor between different fish/egg lots. Different fish/egg lots are physically isolated from each other by separate ponds or incubation units. The intent of these activities is to prevent the horizontal spread of pathogens by splashing water. Tank trucks are disinfected between the hauling of adult and juvenile fish. Footbaths containing disinfectant are strategically located on the hatchery grounds to prevent spread of pathogens.

9.2.8 Smolt development indices (e.g. gill ATPase activity), if applicable.

Besides time, size and past history, aggressive screen and intake crowding, swarming against sloped pond sides, a silvery physical appearance and loose scales during feeding events are signs of smolt development. From past history, hatchery specialists will reduce feed regimes in early spring as fish show signs of smolting. Also at this time feed conversions fall and fish appear leaner with condition factors falling well below 1.0 (K) to .90 (K).

9.2.9 Indicate the use of "natural" rearing methods as applied in the program.

None.

9.2.10 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

- Steelhead are mass marked.
- Listed fish are not under propagation.
- Holding pond procedures follow IHOT guidelines.
- Non-target listed fish will be released immediately, if encountered, during the brood stock collection process.

Section 10. Release

10.1 Proposed fish release levels.

Age Class	Annual Release Level	Size (ffp)	Release Date	Location			
				Stream	Release Point (RKm)	Major Water-shed	Eco-province
Yrlg	60,000	5.0/ 5.5	April 15-May 15	N.F. Washougal & Main Washougal	2.4 & 3.2	Washougal	Lower Columbia

10.2 Specific location(s) of proposed release(s).

For broodstock and river plants, 60,000 smolts at 5.0 fpp are released starting in April. 50% is released (on-station RKm 2.4) in the N.F. Washougal and the other 50% is trucked and released into the main Washougal River at RKm 12.9.

10.3 Actual numbers and sizes of fish released by age class through the program.

	Yearling Release			Total Release from WDFW Region 5 Plants		
Release Year	No.	Date (MM/DD)	Avg Size (fpp)	No.	Date (MM/DD)	Avg Size (fpp)
1996	132800	nya	nya	278124	April 15-May 10	5.7
1997	120800	nya	nya	192518	April 15-May 10	6.0
1998	115000	nya	nya	321125	April 15-May 10	5.6
1999	115300	nya	nya	333370	April 15-May 10	5.6
2000	62743	January 11	8.5	247866	April 15-May 10	5.4
2001	55100	nya	nya	252782	April 15-May 10	5.6
2002	61000	nya	nya	188579	April 15-May 10	5.0
2003	61206			Na	April 15-May 10	5.5

10.4 Actual dates of release and description of release protocols.

For broodstock and river plants, 60,000 smolts at 5.0 fpp are released starting in April. 50% is released (on-station RKm 2.4) in the N.F. Washougal and the other 50% is trucked and released into the main Washougal River at RKm 12.9. Since 2002, plants dates have ranged from April 22 – May 1st.

10.5 Fish transportation procedures, if applicable.

Equipment Type	Capacity (gallons)	Supp. Oxygen (y/n)	Temp. Control (y/n)	Norm. Transit Time (minutes)	Chemical(s) Used	Dosage (ppm)
Tanker Truck	1900	Y	N	90	Sodium Chloride (Salt)	5000 ppm (~0.5%)

Fish are loaded with 6" fish pumps and oxygen is supplied through diffuser stones in the tanks. Densities are always less than one pound per gallon. Time of transport can last twenty minutes to an hour. Primary truck is insulated while the other transport trucks are not. No problems with elevated temperatures during hauling are observed.

10.6 Acclimation procedures (*methods applied and length of time*).

Smolts are pumped from ponds, and transported for direct releases into the N.F. Washougal River (adjacent to Skamania Hatchery) and the Washougal River at two sites downriver.

10.7 Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

All program summer steelhead are adipose fin clipped so that they can be distinguished from the natural population.

10.8 Disposition plans for fish identified at the time of release as surplus to programmed or approved levels

If surplus exceeds 10% of the permitted release number (Section 7 permit), complex manager would contact regional manager. Regional manager would in turn contact the appropriate policy persons for determination in disposition of excess production. Resident lakes could be used where a clear expectation of sport harvest can occur.

10.9 Fish health certification procedures applied pre-release.

Prior to release, the population health and condition is established by the Area Fish Health Specialist. This is commonly done 1-3 weeks pre-release and up to 6 weeks on systems with pathogen free water and little or no history of disease. Whenever abnormal behavior or mortality is observed prior to normal examination schedule, staff will contact the Area Fish Health Specialist. The fish specialist examines affected fish, and recommends the appropriate treatment. Reporting and control of selected fish pathogens are done in accordance with the Co-managers Fish Disease Control Policy and IHOT guidelines.

10.10 Emergency release procedures in response to flooding or water system failure.

If the program is threatened by ecological or mechanical events, the Complex Manager would contact and inform regional management of the situation and determination and directive per Section 7 guidelines and policy. Based on a determination of a partial or complete emergency release of program fish, personnel would pull screens and sumps to allow a force release of fish.

No release of fish will occur without a review by WDFW Fish Management and a risk assessment.

10.11 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

- The production and release of smolts through fish culture and volitional release practices fosters rapid seaward migration, limiting freshwater interactions with naturally produced chinook, steelhead and chum juveniles.
- WDFW uses acclimation and release of smolts in lower river reaches where possible. Smolt releases from this facility occur below known wild fish spawning and rearing habitat in the upper Washougal tributaries.
- WDFW will be reviewing the Washougal programs to implement a May 1st release date.
- Returning hatchery fish are under heavy selective harvest and are identified by adipose-fin clip mark.
- Hatchery stock and wild fish are isolated by timing.
- Surplus adults are taken to landlocked lakes for additional harvest and to remove potential spawners.
- WDFW proposes to continue monitoring, research and reporting of hatchery smolt migratory performance behavior, and intra- and inter-specific interactions with wild fish to assess, and adjust, if necessary, hatchery production and release strategies to minimize effects on wild fish.
- WDFW fish health and operational concerns for Washougal Hatchery programs are communicated to Region 5 staff for risk management or needed treatment. See also section 9.7.

Section 11. Monitoring and Evaluation of Performance Indicators

11.1.1 Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

Continue to calculate annual fisheries contribution rates based on coded-wire-tag recoveries in regional commercial and sport fisheries. Continue use of mass marked (ad clip) and coded-wire-tagged groups as effective management and research tools. Ongoing research by the Kalama Research Station may provide applicable methods for management of this steelhead program. Also see HGMP Section 1.10.

11.1.2 Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

With the loss of Mitchell Act funding, staffing and logistical support may be lost to continue the monitoring and evaluation of this and other programs on the Columbia River. Current Region 5 Fish Program staff are available to complete monitoring and evaluation of baseline Lower Columbia system needs while research is on-going for coho interaction in the Lewis River and steelhead in the Kalama River.

11.2 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

Monitoring, evaluation and research follow scientific protocols with adaptive management process if needed. WDFW will take risk aversion measures to eliminate or reduce ecological effects, injury, or mortality as a result of monitoring activities. Most trap mortalities are the result of extreme environmental conditions that flood traps or equipment failure. WDFW will take precautions to make sure the equipment is properly functioning during the season. If environmental conditions are forecast that will cause high mortality then traps will be removed or opened up to allow unobstructed passage without mortality. Any take associated with monitoring activities is unknown but all follow scientific protocols designed to minimize impact.

Section 12. Research

12.1 Objective or purpose.

No research is directly associated with the program. 4,000 steelhead from Skamania at 45 fish per pound (fpp) are sent to Willard Lab for research (August).

Ongoing research on the Kalama River will be used to evaluate steelhead programs in the Washougal system. The objectives of this work are to: 1) design and implement a wild broodstock hatchery program, 2) assess the reproductive success of hatchery fish from wild broodstock relative to that of wild fish, 3) measure interbreeding between wild fish and hatchery fish from wild broodstock and its effect on productivity of the naturally spawning population, and 4) assess the efficacy of wild broodstock hatchery programs in achieving natural production and other fishery management objectives including containment of risks to wild stocks. A thorough treatment of goals and objectives of the program as well as justification for and benefits of the work in the Kalama Basin is provided in Sharpe et al. (2000).

12.2 Cooperating and funding agencies. See Kalama River wild summer and winter steelhead HGMPs.

12.3 Principle investigator or project supervisor and staff. NA

12.4 Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.NA

12.5 Techniques: include capture methods, drugs, samples collected, tags applied. NA

12.6 Dates or time periods in which research activity occurs. NA

12.7 Care and maintenance of live fish or eggs, holding duration, transport methods. NA

12.8 Expected type and effects of take and potential for injury or mortality. NA

12.9 Level of take of listed fish: number of range or fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).NA

12.10 Alternative methods to achieve project objects.

12.11 List species similar or related to the threatened species; provide number and causes of mortality related to this research project. NA

12.12 Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury or mortality to listed fish as a result of the proposed research activities. NA

Section 13. Attachments and Citations

13.1 Attachments and Citations

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Section 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

14.1 Certification Language and Signature of Responsible Party

"I hereby certify that the information provided is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Take Table 1. Estimated listed salmonid take levels by hatchery activity.

Fall Chinook

ESU/Population	Lower Columbia River Fall Chinook
Activity	Skamania Summer Steelhead (Hatchery) Program
Location of hatchery activity	Skamania Hatchery
Dates of activity	July – December
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0*	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	nya	nya
Unintentional lethal take (g)	nya	nya		nya
Other take (specify) (h)	nya	nya	nya	nya

* Chinook are taken for the fall Chinook broodstock program directly. See Washougal Fall Chinook HGMP.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category.

Take Table 2. Estimated listed salmonid take levels by hatchery activity.

Chum

ESU/Population	Lower Columbia River Chum
Activity	Skamania Summer Steelhead (Hatchery) Program
Location of hatchery activity	Skamania Hatchery
Dates of activity	July – December
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0*	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	nya	nya
Unintentional lethal take (g)	nya	nya	0	nya
Other take (specify) (h)	nya	nya	nya	nya

0* Chum are not seen at this upper location.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category.

Take Table 3. Estimated listed salmonid take levels by hatchery activity.

Steelhead

ESU/Population	Lower Columbia River Summer Steelhead
Activity	Skamania Summer Steelhead (Hatchery) Program
Location of hatchery activity	Skamania Hatchery
Dates of activity	July – December
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0*	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	nya	nya
Unintentional lethal take (g)	nya	nya		nya
Other take (specify) (h)	nya	nya	nya	nya

0* Up to 10 listed steelhead annually can be sorted and released from the holding pond. No observed mortality has been reported by staff.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or do wnstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category.

Take Table 4. Estimated listed salmonid take levels by hatchery activity.

Steelhead

ESU/Population	Lower Columbia River Winter Steelhead
Activity	Skamania Summer Steelhead (Hatchery) Program
Location of hatchery activity	Skamania Hatchery
Dates of activity	July – December
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0*	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	nya	nya
Unintentional lethal take (g)	nya	nya		nya
Other take (specify) (h)	nya	nya	nya	nya

0* Up to 15 listed steelhead annually can be sorted and released from the holding pond. No observed mortality has been reported by staff.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category

Take Table 5. Estimated listed salmonid take levels by hatchery activity.

Coho(Proposed)

ESU/Population	Lower Columbia River Coho
Activity	Skamania Summer Steelhead (Hatchery) Program
Location of hatchery activity	Skamania Hatchery
Dates of activity	July – December
Hatchery Program Operator	WDFW

Type of Take	Annual Take of Listed Fish by life Stage (number of fish)			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass (a)	nya	nya	nya	nya
Collect for transport (b)	nya	nya	nya	nya
Capture, handle, and release (c)	nya	nya	0*	nya
Capture, handle, tag/mark/tissue sample, and release (d)	nya	nya	nya	nya
Removal (e.g., broodstock (e)	nya	nya	nya	nya
Intentional lethal take (f)	nya	nya	nya	nya
Unintentional lethal take (g)	nya	nya	0	nya
Other take (specify) (h)	nya	nya	nya	nya

0* Wild coho are seen occasionally and released back to stream. No observed mortality has been reported.

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.

b. Take associated with weir or trapping operations where listed fish are captured and transported for release.

c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.

d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.

e. Listed fish removed from the wild and collected for use as broodstock.

f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.

g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.

h. Other takes not identified above as a category